

Outcome of Platelets Rich Plasma (PRP) in Treatment of Plantar Fasciitis

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Pervez Ali, Zulfiqar Ali, Sadaf Junejo

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Plantar fasciitis is a common cause of heel pain in 11-15% of adults in the age group between 40-60 years, requiring professional care¹. It is believed to result primarily from repetitive microtrauma and excessive strain on the plantar fascia². It is a non-inflammatory, degenerative process³. Risk factors are tightness of Tendo Achilles or gastrocnemius muscle, obesity, weight-bearing professions, advanced age, poor footwear, overtraining and reduced subtalar joint mobility⁴. It is a problematic condition treat. Non-surgical management includes rest, structured physical therapy, home stretching exercises, heel cushions, orthoses, ice, NSAIDs, weight loss, night splinting and periods of immobilization^{5,6}. Invasive techniques include corticosteroid injection, PRP injection, botulinum toxin injection and Extracorporeal Shock Wave Therapy (ESWT). Surgical procedures include plantar fasciotomy and gastrocnemius recession^{6,8}.

Platelet-rich plasma (PRP) is an autologous concentration of human platelets in a small plasma volume. It can be seen as a small fluffy or cloudy layer between the top clear plasma and bottom red cell layers. Concentrating seven fundamental protein growth factors enhances tendon and ligament healing by initiating the body's natural healing response. PRP use in treating plantar fasciitis is a relatively recent and evolving concept. There are inconsistencies in the current literature. Furthermore, there is not enough literature available from local regions. Demographics and ethnic components can significantly impact patients' responses to specific treatments and alter disease course. Therefore, the current study was conducted to evaluate the efficacy of Platelet-rich plasma (PRP) in improving the pain in patients with plantar fasciitis presenting to a tertiary care centre in Sindh, Pakistan.

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A prospective observational study was conducted in the Department of Orthopedics, Jinnah Postgraduate Medical Centre (JPMC), Karachi, from July 2018 to June 2019. A nonprobability convenience sampling

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technique was used to enroll the participants in the study.

Patients included were aged between 20-60 years, of both genders, with a symptomatic Plantar Fasciitis of at least three months duration, willing to undergo intervention, failed conservative treatment, and never had PRP injection. Those with previous calcaneum fracture, inflammatory arthritis, osteoarthritis around the ankle, wound or skin in the ankle, nerve-related symptoms, and patients with diabetes mellitus, and hypertension, were excluded.

Approval from the JPMC ethics committee was taken for the study, and the proforma was prepared. Patients were selected from the outdoor patient department for the procedure. The procedure was performed at a daycare. Patients were explained the study's purpose, and the procedure's pros and cons were discussed. Informed consent was taken.

A consultant and senior resident performed the entire procedure using the standard technique of 20 ml of venous blood drawn from each patient. Drawn blood was put in a centrifuge container with citrate dextrose anticoagulant. Blood was centrifuged in a centrifuge machine at 3200 revolutions per minute. 2-3 ml PRP layer was obtained from 20 ml blood and separated in a 10 cc Syringe, and PRP was prepared as per the latest guidelines and instructions¹¹. PRP was obtained after taking the informed consent of the participant. 3 to 5 ml of blood was procured after checking for baseline platelet counts of the patient. Citrate dextrose was added to the blood drawn to prevent platelet activation. We used a tabletop cold centrifuge device to perform differential centrifugation.

All patients taking NSAIDs were requested to cease the treatment at least one week before. Using all aseptic measures, PRP was injected from the medial side into the point of maximum tenderness at the base of the plantar fascia origin from the calcaneus tubercle. Every patient received a single injection of PRP.

Patients were sent home with the necessary instructions and medications. They were advised to avoid strenuous activity for at least four weeks and followed up at one-month, three-month and six-month intervals. Per visit, the pain was recorded using the Visual Analogue Scale (VAS).

The final outcome was obtained by using Roles and Maudsley scores. Modified criteria of the Roles and Maudsley scoring is, Excellent: No pain (VAS = 0; patient satisfied with the treatment outcome and unlimited walking without pain), Good: Symptoms substantially decreased (VAS = 1-4; patient satisfied with the treatment outcome and ability to walk without pain for greater than one hour), Acceptable: Symptoms somewhat decreased (VAS = 5-6; patient slightly satisfied with the treatment outcome), Poor:

Symptoms identical (VAS > 7; patient not satisfied with treatment outcome). Findings and data were recorded on a predesigned proforma. Bias and confounders (e.g., comorbidities such as hypertension, diabetes, etc.) were controlled by strictly following the inclusion and exclusion criteria as these may impact the patient outcome.

Statistical package of social sciences version 21 was used for data compilation and analysis. Frequency and percentage were computed for qualitative variables like gender, obesity, socioeconomic status, education, side involved and outcome. Quantitative variables were presented as mean \pm SD like age, disease duration, height, weight, BMI, and pre and post-treatment pain scores. Effect modifiers like gender, age, BMI, obesity, disease duration, socioeconomic status, education, and side involved were controlled through stratification. Post stratification Chi-square test was applied, and P-value ≤ 0.05 was considered significant.

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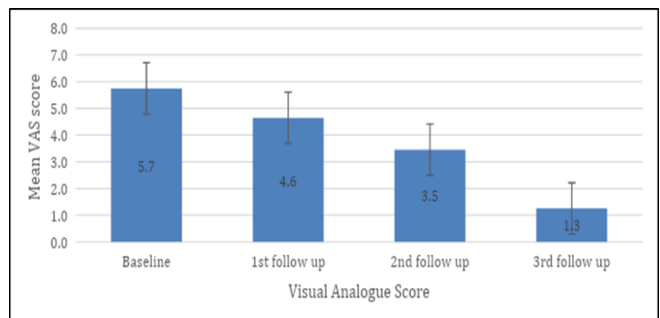
Two hundred ninety-five patients were included in the study, 05 (1.7%) were males, and 290 (98.3%) were females with a mean age of 45.39 \pm 12.49 years. 171 (57.98%) patients had bilateral plantar fasciitis. In 70 (23.72%) patients' the right heel was involved and in 54 (18.3%) patients, left heel plantar fasciitis was involved (7 DEQH ,

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3DUDPHWHL	Q
Age (Years)	45.39 \pm 12.49
Height (cm)	153.00 \pm 9.16
Weight (Kg)	73.16 \pm 12.21
BMI (kg/m ²)	31.46 \pm 5.55
'XUDWLRQ RI 3URFHGXUH	37.68 \pm 10.16'
*HQGHU	Male 5 (1.7)
	Female 290 (98.3)
2EHVLW\	Yes 250 (84.7)
	No 45 (15.3)
6RFLRHRFRQRPVWDWXV 3.5	10,000-24,000 95 (32.2)
	25,000-50,000 150 (50.8)
	> 50,000 50 (16.9)
	Not Educated 98 (33.2)
	Primary to Secondary 143 (48.5)
(GXFDWLRQ VV	Intermediate to Graduate 44 (14.9)
	More than graduate 10 (3.4)
	Right 70 (23.7)
6LWH LQYROYI	Left 54 (18.3)
	Bilateral 171 (58.0)

9LVXDO DQDOR, VFRUH	%DVHC	Mild(1-3)	67(22.7)
		Moderate (4-6)	106(35.9)
		Severe(>=7)	122(41.4)
	VW IROOR	NoPain(VAS=0)	45(15.3)
		Mild(1-3)	63(21.4)
		Moderate (4-6)	107(36.3)
	QG IROOR	Severe(>=7)	80(27.1)
		NoPain(VAS=0)	75(25.4)
		Mild(1-3)	83(28.1)
	UG IROOR	Moderate (4-6)	95(32.2)
		Severe(>=7)	42(14.2)
		NoPain(VAS=0)	149(50.5)
2XWFRPH VF		Mild(1-3)	136(46.1)
		Moderate (4-6)	7(2.4)
		Severe(>=7)	3(1.0)
		Acceptable	7(2.4)
		Excellent	149(50.5)
	Good	136(46.1)	
	Poor	3(1.0)	

According to the Visual analogue score, at 1 month followup 45 (15.3%) patients showed excellent (VAS = 0) results to platelet rich plasma therapy, 63 (21.4%) patients showed good (VAS = 1 to 4) results, 107 (36.3%) patients showed acceptable (VAS = 4 to 6) results and 80 (27.1%) patients showed poor (VAS = 7) results. At 6 months followup 149 (50.5%) patients showed excellent (VAS = 0) results to platelet rich plasma therapy, 136 (46.1%) patients showed good (VAS = 1 to 4) results, 07 (2.37%) patients showed acceptable (VAS = 4 to 6) results and 03 (1.01%) patients showed poor (VAS = 7) results (7 DE Ø H ,), * 85 (, & + \$ 1 * (, 1 9 \$ 6 6 & 25 () 520 % \$ 6 (/ , 1 (\$ 1 ' 83 7022 17 + 6 5 ') 2 / 2 : - 83 9 , 6 , 7



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		2XWFRPH VFRUH				3-YDOXH
		\$FFHSW	([FHOOI	*RRG	3RRU	
\$JH \HDUV	<= 30	0(00%)	28(57.1%)	19(38.8%)	2(4.1%)	0172
	31 - 40	2(3.9%)	29(56.9%)	20(39.2%)	0(0.0%)	
	41 years - 50	3(4.4%)	30(44.1%)	34(50.0%)	1(1.5%)	
	51 years & above	2(1.6%)	62(48.8%)	63(49.6%)	0(0.0%)	
*HQQGHU	Female	7(2.4%)	146(50.3%)	134(46.2%)	3(1.0%)	0959
	Male	0(0.0%)	3(6.0%)	2(4.0%)	0(0.0%)	
%0, FDWHJR	< 185	0(0.0%)	8(53.3%)	7(46.7%)	0(0.0%)	0009
	185 to < 25	3(13.6%)	9(40.9%)	10(45.5%)	0(0.0%)	
	25 to < 30	0(0.0%)	5(50.0%)	4(40.0%)	1(10.0%)	
	30 & above	4(1.6%)	127(51.2%)	115(46.4%)	2(0.8%)	
2EHVLW\	Yes	4(1.6%)	128(51.2%)	116(46.4%)	2(0.8%)	0167
	No	3(6.7%)	21(46.7%)	20(44.4%)	1(2.2%)	
(GXFDWLRQ	Intermediate to Graduate	0(0.0%)	9(20.5%)	35(79.5%)	0(0.0%)	0001*
	More than graduate	0(0.0%)	9(90.0%)	1(10.0%)	0(0.0%)	
	Not Educated	2(2.0%)	55(56.1%)	40(40.8%)	1(1.0%)	
	Primary to Secondary	5(3.5%)	76(53.1%)	60(42.0%)	2(1.4%)	
6RFLRHHFRQR VWDWXV	10000 24000	1(1.1%)	52(54.7%)	40(42.1%)	2(2.1%)	0451
	25000 50000	4(2.7%)	69(46.0%)	76(50.7%)	1(0.7%)	
	> 50000	2(4.0%)	28(56.0%)	20(40.0%)	0(0.0%)	
6LWH LQYRO	Bilateral	4(2.3%)	77(45.0%)	88(51.5%)	2(1.2%)	0254
	Left	2(3.7%)	28(51.9%)	23(42.6%)	1(1.9%)	
	Right	1(1.4%)	44(62.9%)	25(35.7%)	0(0.0%)	

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		0HDQ 6WG	'HYL 0LQLP> 0D[LPX	3-YDOXH		
		%DVHOLQH	575	254	1	10
9LVXDO DQD	^{VW} IROORZ X\$	465	303	.0	100	0001*
VFRUH 9\$6	^{QG} IROORZ X\$	345	286	.0	100	
	^{UG} IROORZ X\$	125	151	.0	80	

Results were more satisfactory in educated patients than noneducated ones, as shown by their compliance with the therapy. Similarly, body mass index also affected the efficacy of PRP. Patients' outcomes did not differ significantly ($p=0.172$) in different age groups, thus indicating that age did not impact the patient outcome (7DEQH , , ,) LJXU illustrate the change in VAS from baseline to the last followup. The difference was most significant at first followup and gradually the change decreased because the baseline pain subsided with time. Pain score when compared from baseline to last followup, there was a statistically significant difference P-Value < 0.05 7DEQH , , ,

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After trying different treatment options for plantar fasciitis, researchers attempted to explore treatments which could be safe, cost-effective, noninvasive and give satisfactory early and long-term results. Their attention was drawn towards Platelet-rich plasma (PRP) when its role in the healing of various problems of tendons and fasciae gradually started getting proven⁶. PRP use in plantar fasciitis has satisfactory results without any severe side effects, as it is autologous⁶⁸. The present study indicated that PRP injection resulted in reduced pain among patients with plantar fasciitis. The study observed no side effects, including vomiting, infection, skin discoloration, allergic reaction, etc., were observed in the study. Furthermore, we also observed decreasing VAS on subsequent followups (7DEOH). In line with the current study, a study by Acosta-Olivo et al.¹² revealed the change in mean VAS at three months of PRP treatment from 2.42 ± 1.45 to 0.62 ± 0.73 .

A study by Gonnade N et al.¹³ had similar findings as our study that PRP injection in plantar fasciitis has better long-term efficacy. Chew SK 2016⁷ showed that PRP injection had a better outcome than conservative treatment. Jain K 2015⁴⁴ had better long-term effects of PRP injection than other treatments. Shetty SH 2019¹⁵ in their research, showed better long-term results and lesser reinjections of PRP in plantar fasciitis than conservative and other forms of invasive treatment. Jimenez-Perez AE 2019¹⁶ revealed that PRP is efficient, safe and has a long-standing effect on plantar fasciitis when injected compared to other injections.

Ling Y 2018¹⁷ in their study showed that PRP injection has a better effect and is more durable in the long term than other invasive methods. Singh P 2017¹⁸ revealed that PRP injection has better improvement in pain and function than other modalities used for plantar fasciitis treatment. Vahdatpour B 2016¹⁹ showed that PRP injection in the heel improved pain and functional limitation due to plantar fasciitis. Acosta-Olivo C et al.¹² showed that PRP injection was very effective and produced results comparable to corticosteroid injection. Minto RR 2014²⁰ showed better results with PRP injection compared to other forms of invasive procedures. Wilson JJ 2014²¹ & Shetty VD 2014²² in their studies showed promising results of PRP injection in plantar fasciitis. A recent meta-analysis found that even though PRP revealed more substantial improvement in VAS than other treatments, it did not affect the Roles-Maudsley score (RMS)¹⁷. Therefore, we remain unclear on whether PRP treatment is durable for long-term or not and large-scale, multicenter studies are needed to confirm the current claims. The outcome of PRP can also alter the quality and purity of PRP depending upon the technique used for preparing PRP¹¹.

One limitation of our study is that it did not have a comparative group to assess the PRP modality with other treatment regimes. Therefore, we cannot judge whether PRP treatment is better than corticosteroids or not. Further research is indeed warranted. However, our research showed similar findings to all the above studies that PRP injection in plantar fasciitis shows good results, improving pain and functions.

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Platelet-rich plasma (PRP) injection in treating plantar fasciitis is very effective in the short-term and long-term modalities for relieving symptoms. The present study reported that Platelet-rich plasma (PRP) injection successfully improved pain symptoms in most patients, with at least half of the population reporting excellent outcomes. Further research is indeed warranted to explore the subject in depth.

(WKLFDQ SHUJH) Post Graduate Medical Center Kaachi ERC letter No F.281/2021-GEN/69221/JPMC, dated 03-11-2021.

& RQIOLFW RI QWHLUJH There is no conflict of interest among the authors

)XQGLRQJ was not requested/self-funded

'\$7\$ 6+\$5,1* 67\$7(0 (The data supporting this study's findings are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions

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Khan KM: Data interpretation
Memon IA: Manuscript drafting and writing
Ali P: Data interpretation
Ali Z: Critical review of manuscript
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